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Trabajo Fin de Grado

The impact of AR on the consumer experience: facial filters on social media

El impacto de la Realidad Aumentada en la experiencia del consumidor: filtros faciales en redes sociales

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ABSTRACT

This final degree project consists of an analysis of the changes and improvements that Augmented Reality (AR) technology can make on the consumer experience. Specifically, it is focused on the case of AR facial filters in Social Media, and how they affect users' perceptions and behavioral intentions. Based on a literature review, this project aims to show the multiple applications of AR in different fields and to investigate the impact of facial filters on the consumer experience. The results of an online questionnaire reveal the importance of variables related to perceptions of facial filters (ease of use, originality), and their positive association with users' satisfaction and intentions of recommending facial filters or of continuing using both social media and facial filters.

RESUMEN

Este Trabajo de Fin de Grado consiste en un análisis sobre los cambios y mejoras que la tecnología de la Realidad Aumentada (RA) puede causar en la experiencia del consumidor. Concretamente, se centra en el caso de los filtros faciales de RA en redes sociales, y como afectan a la opinión y comportamiento del consumidor. Partiendo de un marco teórico, este documento pretende mostrar las múltiples aplicaciones de la RA en diversos campos e investigar el impacto de los filtros faciales en la experiencia del consumidor. El resultado de un cuestionario online nos revela la importancia de las variables relacionadas con las percepciones de los filtros faciales (facilidad de uso, originalidad), y su positiva relación con la satisfacción e intenciones de los usuarios a la hora de recomendarlos o continuar con su uso, tanto de estos como con el de las redes sociales.

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1. INTRODUCTION

In the last few years, we are witnessing a process where Information and Communications Technologies (ICTs) are changing our lives dramatically, especially the ways we communicate and relate to each other. Lately, we have experimented an increase in new disruptive technologies thanks to devices as smartphones or tablets that we can find almost everywhere and that make the access to information more available. According to this, technologies as Augmented Reality have developed in the recent years and are linked to how technology can enhance our perception of reality.

Although AR started to develop many years ago and it was introduced in sectors as health or aviation, is in the latest years when the majority of AR initiatives have been focused in new applications, above all in the fields of entertainment and marketing, while other sectors, such as tourism and education, are also starting to get into AR. (Telefónica, 2011). The introduction of AR in the marketing field is caused by the discovery of the consumers' interest in AR, and a new tendency, with a more practical approach, that is making possible that AR applications are already available (Telefónica, 2011). AR is an entertaining way of connecting with potential clients. By combining the virtual world with the real world, AR enriches consumer experience and allow consumers to interact with the real environment and virtual elements at the same time (Solomon, Russell-Bennett & Previte, 2012).

AR is having a huge impact on social media since it can be a method of entertainment, teaching, helping, or acting as a source of information or knowledge (Yuen, Yaoyuneyong & Johnson, 2011). Many social networks (e.g., Snapchat, Instagram, and Facebook) are already using this technology, and, although it is an innovative technology that is still developing, brands and companies have started to use it as a marketing tool (Fombona, Pascual & Madeira, 2012).

One of the most popular applications of AR in social media are facial filters, which consist of, through a mobile device, superimposing virtual objects over the face of the person. These facial filters are currently very common in Snapchat or Instagram, where consumers can enjoy the different filters offered by the platform. With the increasing popularity of facial filters, these platforms have developed a wide variety to the point that

brands have also used the creation of these filters as a marketing tool (Fombona, Pascual & Madeira, 2012).

Considering the potential of AR for the present and future of social media marketing (Bullock, 2018), the goal of this final degree project/undergraduate dissertation is to identify the changes and improvements that AR can make on the consumer experience. Specifically, the project is focused on the way that AR facial filters in social media affect the users' perceptions, satisfaction, and behavioral intentions. Consumer experience can be very different depending on the tools that firms and companies use, not only in terms of the interactions with the product, but also with the brand in general. Therefore, a more specific goal is to analyze the different variables that affect consumers in their experience with facial filters.

This final degree project is divided in 4 parts. First, a description of AR as a concept is developed. Specifically, this section makes a distinction between AR and other concepts that are usually confused with, such as virtual reality (VR). It also shows the evolution of AR through the years, highlighting the most important inventions; in addition, the different types of AR are classified; and, finally, an explanation of the multiple applications of AR is described, focusing on marketing and social media.

Following this literature review, the methodology of the empirical study is described, which consisted of an online questionnaire carried out with a sample of 401 social media users. The study analyzed the impact of facial filters on consumers. In this section, the sampling plan, questionnaire and measurement instruments are explained.

After that, the analysis of the survey is reported, focusing on the characteristics of the sample and the participants' perceptions about the use of facial filters, their satisfaction and behavioral intentions.

Finally, the conclusions of the project are explained, and recommendations are offered. The dissertation ends with limitations and future research directions.

2. AUGMENTED REALITY

This section is going to develop the concept of Augmented Reality (AR). First, a definition of concepts and differences between AR, Virtual Reality (VR) and Augmented Virtuality (AV) is made. Once the concept is clear, the evolution of Augmented Reality through the time is described, followed by a classification of the different existing types of AR. Finally, the section discusses possible applications of AR, focusing on marketing activities and Social Media.

2.1. Definition of Augmented and Virtual Reality: The Reality-Virtuality continuum

The "Reality-Virtuality Continuum" (Milgram & Kishino, 1994), has been the starting point for researchers to classify the wide variety of realities (Flavián, Ibáñez-Sanchez and Orús, 2018). In the Reality-Virtuality continuum (Fig. 1), Milgram and Fumio Kishino (1994) described the existing realities that went from completely virtual (virtual reality; VR) to completely real (reality) environments. Between these two extremes, they take into account different combinations of virtual and real objects to conform different levels of Mixed Reality (MR).

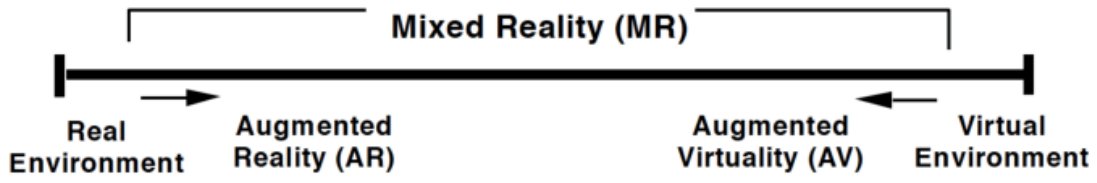

Figure 1: Simplified representation of a RV continuum (Milgram & Kishino, 1994)

In Fig. 1, we can appreciate that, as we move from left to right, the degree of computer-generated stimuli increases. That is, in the right extreme it is located the immersive virtual reality, where all stimuli are generated by computers, while on the left extreme we can find the complete reality (people, objects, plants…). Between both extremes, where virtuality and reality are mixed, we can find Mixed Reality (MR), consisting of Augmented Reality (AR) (virtuality superimposing reality), and Augmented Virtuality (AV) (reality superimposing virtuality).

Both AR and AV blend representations of virtual and real world elements together in a single user interface. The difference between the two terms comes down to where the interaction takes place. If the interaction happens in the real world, it is augmented reality. If the interaction occurs in a virtual space, it is considered augmented virtuality. (Spacey, 2016).

Next, we are going to go into depth with these three realities: First, VR is defined as an artificial, computer-generated simulation or recreation of a real life environment or situation that immerses the user by making them feel like they are experiencing the simulated reality firsthand, primarily by stimulating their vision and hearing (Levit, 2018). Second, in AR users see and interact with the real world while digital content is superimposed to it (Forbes, 2018). The clearest example is Pokemon Go[1], a game that gained a lot of fame in 2017 that consisted of searching for small virtual creatures, but in the real world. AR technologies make the limits between users and devices disappear, making the user participant of a new world differentiated by the virtual elements.

In summary, we can say that AR creates an experience by adding virtual elements as digital images, sensations or graphics, to the real world, while VR creates a new virtual world with digital elements. Finally, MR can be defined as the union that brings together real world and digital elements, where users interact with and manipulate both physical and virtual items and environments, using next-generation sensing and imaging technologies and that allows users to see and immerse themselves in the world around them. It provides the ability to have one foot (or hand) in the real world, and the other in an imaginary place, breaking down basic concepts between real and virtual offering an experience that can change the way users game and work today (Kunkel and Soechtig, 2017).

By its very nature, Mixed Reality (MR) is a highly interdisciplinary field engaging signal processing, computer vision, computer graphics, user interfaces, human factors, wearable computing, mobile computing, information visualization, and the design of displays and sensors (Costanza, Kunz and Fjeld, 2009). MR concepts are applicable to a wide range

[1] https://www.pokemongo.com/es-es/

of areas including the automotive industry, surgery, and office environments (Costanza, Kunz and Fjeld, 2009).

As stated before, Milgram and Kishino (1994) include both AR and VR as MR, when they are not the same as it has been explained before. Therefore, "there is a need to set clear boundaries between the realities that current technologies are able to create. MR must no longer be the broad part of the continuum that includes AR and AV, as noted by Milgram and Kishino (1994). It should be regarded as an independent dimension falling between AR and AV and characterized by the total blend of virtual holograms with the real world" (Flavián, Ibañez-Sanchez & Orús, 2018; p. 3). (Fig 2) In this figure, we can see the new proposed Reality-Virtuality Coninuum where MR is already an independent dimension from AR and VR.

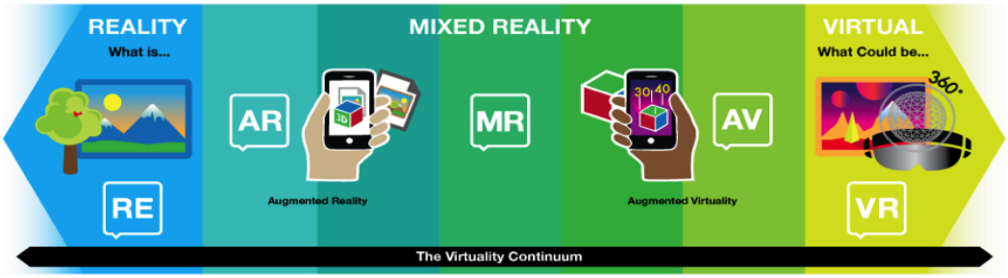

Figure 2: Proposed Reality-Virtuality Continuum (Anderson, M.J., 2015)

2.2 History of Augmented Reality

Now that the concept of AR has been set, we are going to analyze the evolution of AR since its creation until nowadays (Fig. 3), explaining the most significant inventions. AR technology has been improved through the years and has been applied to different fields, increasing with the time its different applications.

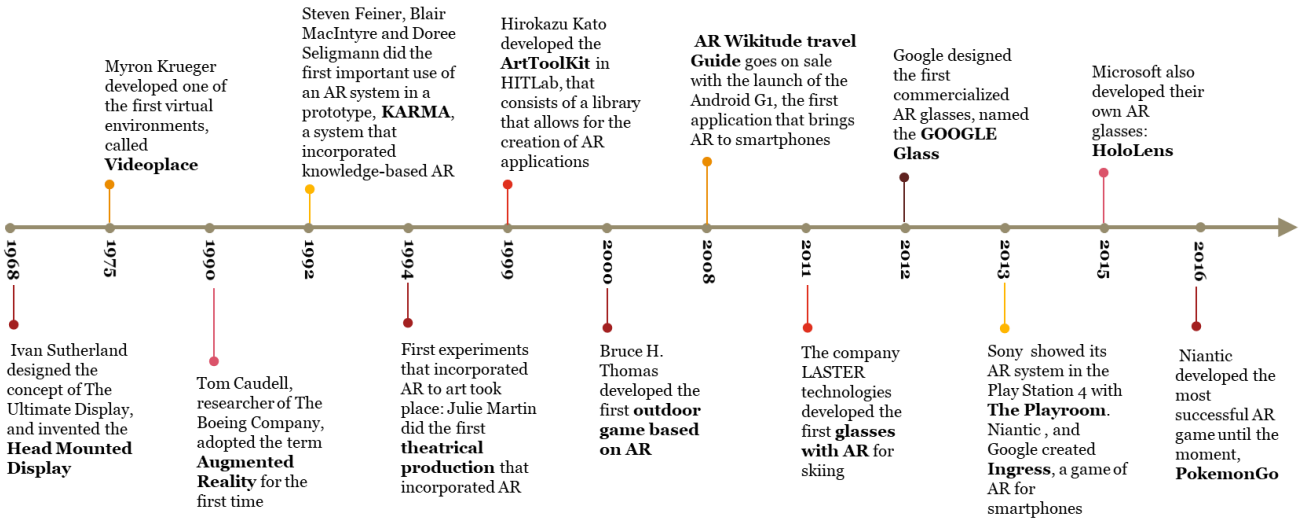

Figure 3: Timeline of evolution of AR.

Nevertheless, before all these technological achievements in the real world, AR has been present in the film industry for many years: In the holograms of the movie "Star Wars" in 1977 (Fig. 4), practical applications in "Terminator" in 1980 or even in the devices of "Dragon Ball" in 1990.

Figure 4: the holograms of the movie "Star Wars" in 1977 (Vivir, R. 2013)

The concept of Augmented Reality was born when the filmmaker Morton Heilig, pioneer in VR technology and filmmaker, started talking about the creation of films where the experience of consumers would be extended to the point of perceiving it with their five senses. In 1961, he created and patented a simulator called Sensorama (Fig 5) that combined 3D movies, stereo sound, mechanic vibes, and air by fans and smells. However, it was not successful. At first sight, the machine was a VR product with certain nuances of AR.

Figure 5: Sensorama simulator created by Morton Heilig. (Trilnick,C. 1962)

In 1968, Ivan Sutherland, considered the "father of computer graphics", designed the concept of The Ultimate Display, and invented the Head Mounted Display (Fig 6). Many people considered this invention as the first VR-AR system. The device allowed for the immersion and interaction of users in and with a virtual world.

Figure 6: Head Mounted Display created by Ivan Sutherland (Ismail and S. Pillai, 2016)

In 1975, Myron Krueger, considered one of the first-generation researchers in VR and AR, developed one of the first virtual environments, called Videoplace (Fig 7) that worked as an artificial reality that surrounded the users. Moves were recorded by a camera, analyzed and transferred to a screen.

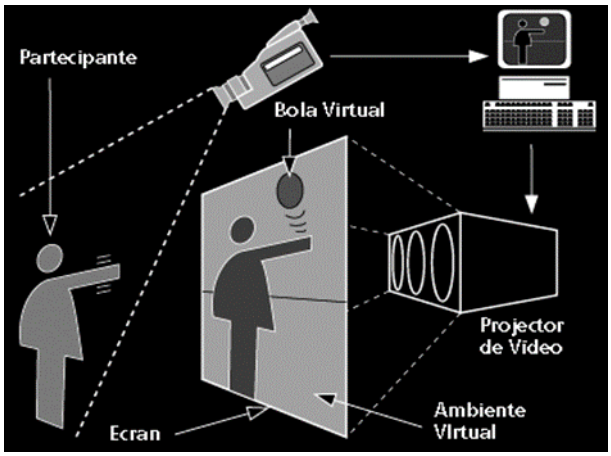

Figure 7: Videoplace created by Myron Krueger (Velazquez Traut, 1975)

Next, Tom Caudell, researcher of The Boeing Company, adopted the term Augmented Reality for the first time in 1990. He was hired to find an alternative to the wires of the workers and he came out with idea of special glasses and virtual boards, so he thought he was "augmenting" the reality of the user (Casella, 2009).

The first applications of AR took place on the field of aviation, where pilots could see information about the plane without disturbing their sight. During the 1990s, AR applications within the industrial and military sector continued developing; however, the high cost and level of technical difficulty kept these technologies far beyond the reach of end users. (Frigo,, da Silva & Barbosa, 2016).

AR kept growing and, in 1992, Steven Feiner, Blair MacIntyre and Doree Seligmann did the first important use of an AR system in a prototype, KARMA, a system that incorporated knowledge-based AR (Rosenblum et al. 2012). This system was capable of automatically inferring appropriate instruction sequences for repair and maintenance procedures.

Later, in 1994, experiments that incorporated AR to art took place. Julie Martin, wife and partner of the pioneer of technological arts Billy Klüver, electrical engineer at Bell Telephone Laboratories who founded Experiments in Art and Technology, did the first theatrical production that incorporated AR.

Few years later, in 1999, Hirokazu Kato, professor in the Nara Institute of Science and Technology (NAIST), developed the ArtToolKit in HITLab that consists of a library that allows for the creation of AR applications. It was presented in the SIGGRAPH (Special

Interest Group on Computer GRAPHics and Interactive Techniques) that year and nowadays it is widely used for the development of AR applications.

In 2000, Bruce H. Thomas developed the first outdoor game based on AR, and it was presented in the International Symposium on Wearable Computers (ARQuake). It was one of the first systems that allows users to play AR games outdoors—allowing them to move in the physical world, and at the same time experience computer-generated graphical monsters and objects (Thomas, 2002).

In 2008, AR Wikitude travel Guide goes on sale with the launch of the Android G1. It is the first application that brings AR to smartphones. It consists of showing all the geolocated information in the screen of mobile phones, like tweets or nowadays Instagram photos (Palou, 2009). One year later, Saqoosha integrates AR Toolkit to Adobe Flash (FLARToolkit), so AR arrives to the Web. In the same year, a project named SixthSense was developed, and consisted of catching users´ movements, interpret and project them in a smooth place. SixthSense is a wearable gestural interface that augments the physical world around us with digital information and lets us use natural hand gestures to interact with that information (Mistry, 2009).

In 2011, the company LASTER technologies[2] developed the first glasses with AR for skiing. This product started on the University of Paris and consisted of glasses that integrate virtual information about the user on its display, such as speed, weather conditions or information about the place.

Google designed a device in 2012 that would be going to be the first commercialized AR glasses, named the GOOGLE Glass (Fig. 8). However, they did not succeed and it was a commercial failure. The idea was great, but the execution and development were not: there was no mainstream advertising campaign, no clear explanation about why the product was fabulous, and not an easy way to buy it (Reynolds, 2015). Three years later, Microsoft also developed their own AR glasses: HoloLens[3] (Fig. 9).

[2] Laster Technologies is a technology company based near Paris that develops augmented reality eyewear.

[3] https://www.microsoft.com/es-es/hololens

Figure 8: GOOGLE Glass created by Google (Google)

Figure 9: HoloLens created by Microsoft (Microsoft)

Since then, AR has been present in gaming: in 2013, Sony[4] showed its AR system in the Play Station 4 with The Playroom. Niantic[5], and in collaboration with Google, they created Ingress, a game of AR for smartphones. Moreover, in 2016 Niantic developed the most successful AR game until the moment, PokemonGo. The renewed version of the known game Pokemon is an AR application with more than 500 million of downloads, that became in few days into the most popular game for smartphones of the history. Apart from its success as an application, the game constitutes such a landmark in the history of technology, because it is the first successful example of mainstream AR. In that moment, Pokemon Go became the most revenued game from iOS and Android above the most famous mobilephone games of the moment, (e.g., Clash Royale, Candy Crush); and the most downloaded just in the first month. This phenomenon did not happen just in US, but around the world. The game consists of creatures called Pokemons that users try to catch. Through AR technology, the application encourages the players to interact with their

[4] https://www.sony.com
[5] https://www.nianticlabs.com

environment using maps where, by a very realistic way, the places around them are represented.

The sector of gaming is taking advantage of the AR and it is expected that in the future much more applications with geotagging are developed, due the fact that the possibility of innovation in this field is enormous (Fig. 10).

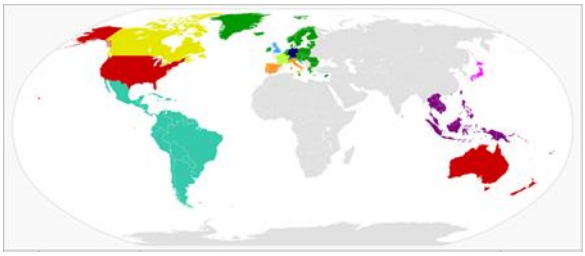

Figure 10: Downloads of Pokemon Go around the world

Finally, in 2017, Apple and Google launched their own AR development kit: ARKIT and ARCore, respectively. Also, Google has developed the second version of their Google Glass, focused on the business world. The user visualizes addresses on them, communications via voice messages transferred to text, video calls or reminders on its timetable. The development of this product will mean an important advance in the field of AR.

2.3 Classification of types of Augmented Reality

According to Edwards-Stuart, Hoyt and Reger (2016), we can find three types of AR, and they are differenced in the way that the content is integrated in the experience. Each one of them has its particularities that makes them more or less appropriate for each situation.

First, we find AR with markers. Markers are printed symbols in paper or images over which there are virtual elements (images, 3D objects, videos, etc.) that appear when the associated application of AR recognizes the marker and enables the experience. It is needed that the marker is located in a plane surface and that the device maintains an adequate distance. The AR software monitors the marker, adjusts the position of the 3D model that appears in the screen when the user moves or turns it. Sometimes, when the camera is not pointing the marker, the virtual content disappears; in other cases, the marker is used exclusively to activate the experience and the content maintains even when the device changes its location.

An example of augmented reality with markers is the company Aurasma[6] (Blázquez, 2018). This company has developed a smartphone application that allows the user to create simple AR experiences associated to the objects that they want to use as markers. It is a very interesting application to convert any image or object in a marker and it is available in Android Market and in Apple Store free.

Markers can be very different: they can be symbols, codes or images more fully developed that incorporate a lot of color and contrast. These markers can appear in books, magazines or photographies. In this way, QR codes (Fig. 11) contain a message that is read by a QR code lector installed in the smartphone. QR codes are not like AR markers that can be exclusively identified by the application that they have been designed for. The information that is shown in markers is determined by the application. However, in a QR code the information or action is codified on the symbol, being able to be read by every QR code lector.

Figure 11: AR through QR code (Chavez, 2012)

An example of an AR application based on QR codes is Daqri[7] that serves to create applications and QR codes and insert images, videos, maps, pdf, links or texts, and AR. In this case, the camera focuses on the real environment, where the user has one or more images called markers that are simple black and white pictures.

Second, marker-less AR applications are based on tangible objects, without the use of any marker (Fig. 12). In marker-less AR, AR is activated trough the image; there is no

[6] https://www.aurasma.com
[7] https://daqri.com

need of using any marker. This type of AR is not sensitive to any object, it uses specific objects to activate and show the information. The lack of marker means the need of a higher power to process the virtual elements (Comport, Marchand & Chaumette, , 2003).

Figure 12: AR without markers (Gijevski N., 2017)

In marker-less AR, the software is capable of recognizing shapes (organic and inorganic) and add virtual objects over them. This technology is recent but it is having a quick evolution and leads to a better immersion for the user, obtaining a better acceptance and use than systems that use markers (Comport, Marchand, Pressigout, & Chaumette, 2006). An example of marker-less AR is virtual fitting rooms. Many brands have already developed this technology, where the user can try on clothes and products of the firm via smartphone. Through mobile phone applications consumers see how clothes fit on them without the need of going physically to the shop.

Finally, the last type of AR is the AR by geolocation (Fig. 13). The device combines the information given by the GPS and information downloaded from the Internet. There is a lot of combinations and dynamics. In this case, it works with the camera of smartphones that do have GPS, accelerator and compass. These three functionalities allow the AR application to determine at which point of the planet, height and address the phone´s camera is pointing. When the location is determined, the device uses the Internet and, with some software (e.g. Layar[8]), searches the available information for that point, and

[8] With the Layar Creator, you can upload images to instantly create a personalized Augmented Reality (AR) experience. https://www.layar.com

then it shows it to the user. This information extracted from the Internet appears on the screen and it adds information to the image that represent these views.

Figure 13: AR by geolocation

When the user moves the smartphone and captures the images of its surroundings, the browser shows the nearest points of interest. These points of interest can be created in several ways. Most of the geolocated AR applications are designed for tourism to help visitors find the points of interest of the city (Kipper & Rampolla,, 2012). By the way, the geolocated AR does not need to be focused only on tourism. The most popular and known example of this type of AR is the game Pokemon Go, already mentioned. Nevertheless, another example of geolocated AR is GPS Compass Map 3D, an application based on a virtual compass that helps the users to orientate through the screen of their mobile phones. It offers information about latitude and longitude and allows you to set an objective in the map (Noguera, 2018).

2.4 Marketing applications of Augmented Reality

Consumers usually identify AR with entertainment and video games, mainly because of the success of Pokemon Go and the confusion with VR, which are mainly oriented to this type of activities (Marchand & Hennig-Thurau, 2013). Even it is true that AR was once thought for other fields of knowledge and that it can be used as an entertainment tool, every sector where users, clients, visitors or workers can be given instructions to make a specific action is sensitive to be improved with this technology.

Recently, AR has been gaining ground in the area of marketing and advertising. AR is still a technology in process of evolution and growth as an advertising resource. Nevertheless, many brands are increasingly using this technology. Thus, it is expected that in a short-term future the number of firms using it significantly raises, given that it is

an innovative technology with huge potential (Solomon, Russell-Bennett & Previte, 2012).

Advertisements that use AR as a marketing tool do meet the effective publicity requirements, allowing the interaction of the consumer, customization of the content, real-time measurable outcomes and surprise the consumer; and so remembering the publicity action in the client (Kramer, 2016). In short, as AR draws consumer's attention, it becomes a differentiating factor with respect to competition and offers the user the possibility to access to visual experiences.

To integrate AR into the marketing strategies of a company, we have to take into account several recommendations (Porter and/& Heppelmann, 2017): provide added value to clients, take into account the geolocation of the user, give relevant information, develop the social interaction at real time, satisfy personal needs of customers, and be alert to the innovations and developments of AR to put them at a service of the consumers.

Introducing AR into marketing strategies can provide companies with several benefits or advantages (Queensland Government, 2017). First, there are few companies using this technology in their business, since it is still developing. Therefore, any company that introduces AR into its marketing strategies is going to generate much more expectation and will be able to **differentiate from their competitors.** An example of this advantage would be a campaign of the firm Braun that allowed users to try their razors as if it was real (Torres, 2017). In this case, the use of this technology can be questionable, because after all the client wants to try the real experience that in this case is impossible. In any case, it caught the eye of the public, differentiating in this way from their competitors, because it was the first one offering something like that. Therefore, it is an innovative campaign that will need to be turned into functional. Another company that also has bet on the AR being pioneer in the sector has been Estiluz, with an application to try the products of the firm[9].

Second, AR represents a new communication channel with clients, visitors or consumers. AR allows the users to **interact in real time with the information and products** that surround them. It is expected that at least half of consumers are willing to pay more for

[9] https://www.estiluz.com/es/app

the product if they can obtain a preview of it through AR (Sheehan, 2018). One of the most popular examples in AR is virtual fitting rooms. With this innovation, firms offer the clients the possibility of trying on their products. It consists of a camera that analyses the dimensions of the user interested in buying in the shop. Many firms have applied this new technology but it needs to be further improved. In any case, virtual fitting rooms have been better implemented in firms focused on complements like jewelry and watches, such as Rolex or Omega through a specific application called Chrono24[10]; but also glasses like the firm Ray Ban (Fig. 14), or make up as the brand Sephora.

Figure 14: Example of AR in Ray Ban

Another example of the interaction of the user with the products of a brand through AR is the new application of IKEA: "Ikea Place"[11] (Fig. 15). It includes a great variety of furniture that can be virtually placed in the house through AR technology of the application, showing the size of each product and how it will look in reality. This is an interesting idea to keep online sales increasing and to solve the biggest problem when buying this type of products, given that the consumers can see how it will look in the their houses and place it where they prefer.

[10] https://www.youtube.com/watch?v=LF2jtRRYt7M&feature=youtu.be
[11] https://www.youtube.com/watch?v=UudV1VdFtuQ

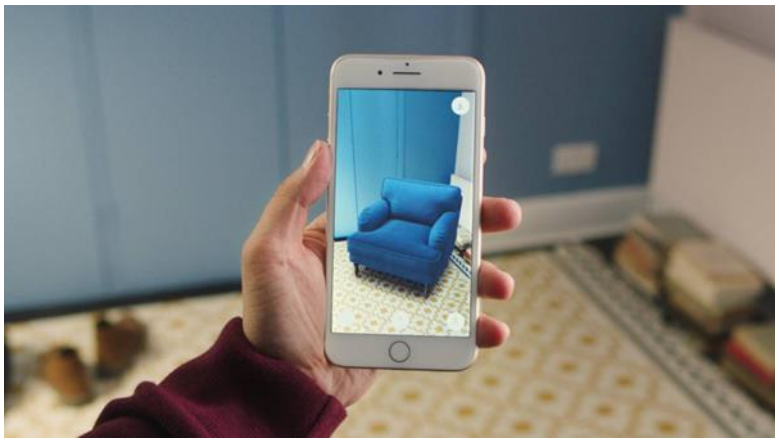

Figure 15: IKEA place AR app.

Third, AR technology allows companies to create much more **personal and exclusive messages** and, thanks to its innovation; it is easier to attract the attention of consumers (Bharadwaj, 2017). The customization ensures the client that she is acquiring the product that best suits her needs. The best example of this would be the already mentioned virtual fitting rooms. Here the client is acquiring the product that best suits her needs because through the app she can try on the ones that she wants or prefers to buy. However, there are more brands developing this strategy as Timberland or L'Oreal.

Fourth, AR offers more possibilities for creating emotional marketing actions by sending messages that appeal to users' feelings (Scholz, 2017). When customers´ feelings are involved, it is easier to surprise them and make a mark on them. Once consumers are surprised by brands, they share it with other people and this helps to **increase the visibility and reputation of a firm** (Bharadwaj, 2017). For instance, in 2014, when the use AR was not so frequent in marketing, Pepsi launched a campaign in a bus stop in London based on AR images like, for example, a meteorite impact. That advertisement made the wait more interesting and enjoyable for users.

A second example of brand creating emotional marketing through AR would be Coca-Cola[12]. With WWF, Coca-Cola, at the Science Museum in London got up close and personal with arctic polar bears. Visitors walked through an icy archway into an arctic-

[12]https://www.youtube.com/watch?v=h2Jg8ryVk1k

themed room lined with fake snow, polar bears and classic Coca-Cola posters. Guests stood on a patch of white carpet and looked at a large, elevated screen to see themselves interacting with a polar bear family. Eventually, the ice starts to break, showing the real threats arctic animals face.

Finally, an important benefit of AR is that it is useful to create surprising **experiential marketing** campaigns to provide immediate information about any product or to improve techniques and possibilities of sales (Jin and Yazdanifard, 2015). One example of an experiential marketing campaign with AR has taken place in some malls in Hungary by National Geographic that allows citizens enjoy the experience of being inside a documentary, interacting with different animals, environments, landscapes. Moreover, besides making people interact with the brand, the action achieves a spectacular visibility with the virality of videos on social media (Hepburn, 2011). In Spain, canal FOX also took advantage of AR to make the audience live the experience of being in one of their series.

To sum up, AR plays a vigorous role in contemporary marketing. Up to date, AR has been introduced in several industries such as the entertainment, engineering, robotics and military industries (Jin and Yazdanifard, 2015). AR is relatively new to the industry, and it allows clients to see a product before buying it and use it as if it was real. The most important issue is that users can know the values, characteristics and benefits of the products in places where it would be physically impossible. AR provides the consumer with a different experience combining reality with virtual objects and images, interacting in real time. This new interaction way allows users to have better experiences with the brand; in addition, the interaction of the user with the environment and its virtual elements encourage the surprising factor that makes them remember the action. This new technology applied to marketing is not only useful to catch consumers' attention but also to provide personalized content.

2.5 Augmented Reality on Social media

Nowadays, one can observe a growing tendency in the use of social networks, a phenomenon that has undoubtedly changed the way of understanding communication between human beings (Carton, 2009). In order to understand the development of AR on social media, it is necessary to review the meaning and origin of social networks.

Social media can be defined as "forms of electronic communication (such as websites for social networking and microblogging) through which users create online communities to share information, ideas, personal messages, and other content (such as videos)" (Merriam-Webster, 2019, p.1). These social tools have been gaining popularity since the appearance of digital marketing, and they have perfectly adapted to the users' changes and demands. They are very important for the diffusion of information and content.

According to the annual study of social media published by IAB Spain (2017), the basic characteristics that a social network must have in order to be considered as such are the following:

- It should be a network of contacts.
- It must allow its users to have a personal profile and give them the opportunity to interact.
- It should offer the functionalities needed to create, share content and/or participate.

Its origin dates to the 1990's when the Internet was born. One of the first example os social network is SixDegrees, a social network service website that lasted from 1997 to 2000 and was based on the Web of Contacts model of social networking (Wikepedia, 2019). It is said to be the first ever social media website. Between 1990 and 2000, other social media websites were developed, such as Yahoo! or Messenger, a popular instant messaging service; MSN Messenger (also known as Windows Live Messenger), another messaging, video and voice calling service; or Habbo, a game-based social networking site (Ritholz, 2010).

In the beginning of the 21st Century, social media received a great boost with the witnessing of many social networking sites springing up (Fig. 16). This fact highly transformed the interaction of individuals and organizations who share common interest in music, education, movies, and friendship, based on social networking. Among those that were launched, as Fotolog, and Friendster (social networking and gaming) and, in 2003, MySpace was one of the most popular social networking sites; LinkedIn, business-oriented social networking service and Skype, a very popular instant messaging and video/voice calling service (Edosomwan et al., 2011). In 2004, popular names like Facebook, the most popular social network, and others like Flikr and Mixi emerged.

During 2005 and 2006, big names like Yahoo!, YouTube, Twitter and Tumblr were created (Junco, Heibergert, & Loken, 2011). Other important social networks that were developed after these years are Pinterest and Instagram (2010), which are photo sharing social networks; Snapchat in 2011; and Tinder (dating-oriented social networking service) and Vimeo (video sharing and social media service) in 2012 and 2013, respectively. Snapchat is one of the most known social media of the latest years, that started as an application that allowed users to share pictures and videos with a limit of time, but then it evolved into a whole communication platform. In 2016, Snapchat achieved 8 billion of visits per day, same figures as Facebook, the biggest social media in the world. (Basave, 2016).

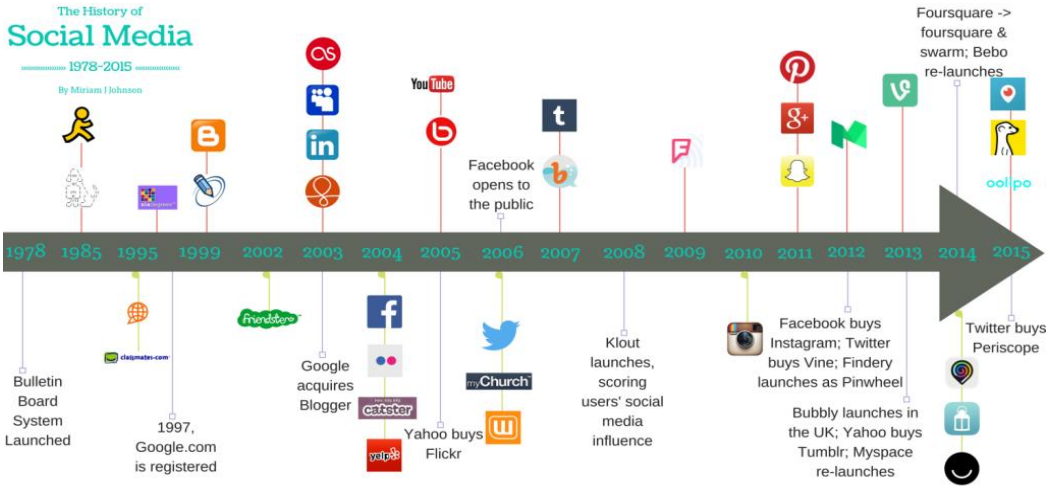

Figure 16: History of Social Media (Allen, 2017)

In 2018, according to the Annual Study of Social Media (Galeano, 2018) there were more than 3,000 millions of users that daily connect to social media in the world, that is to say a 42% of world's population. Regarding user's profile, it is similar between women (49%) and men (51%). Particularly in Spain, the majority of users are between 31 and 45 years, being the average age in 38,4 years. This study also assures that almost half of users of social media have studies in higher education (Galeano, 2018).

Moreover, there has been a change in the way of consuming Social Media. The most used device is the mobile phone (smartphone) with a 95%, followed by a 91% of computers and a 48% from tablets (Galeano, 2018). Instagram and Twitter are the most used social media with smartphones, while Facebook and Youtube the most used with computers.

Furthermore, according to the same study (Galeano, 2018), 81% of users follow brands in their social media and, for 27%, it gives confidence the fact that a brand or company has a profile on social media. Facebook and Instagram are the social media that show higher figures of advertising investment.

The average time that users spend in a day on social media is 58 minutes, being the youngest people the ones that most time spend on them, reaching 1 hour and 10 minutes. Regarding the most used social media, Facebook and Twitter still remain the most used social networks; however, Instagram is the social network with the highest growth in the last years, especially among people under 23. In addition, YouTube is also one of the most popular social networks for young people (between 16 and 18). To sum up, Table 1 shows a list of the most popular social networks at the current moment, together with this year of creation, their description and their main characteristics.

Social Media	***Creation year***	***Description***	***Characteristic***
Facebook	*2004*	*Online social media and social networking service company*	*Users can post text, photos and multimedia of their own devising and share it with other users.*
Instagram	*2010*	*Photo and video-sharing social networking service*	*The app allows users to upload photos and videos to the service, which can be edited with various filters, and organized with tags and location information.*
Twitter	*2006*	*Social networking and microblogging service*	*Users use mobile phones or computers to send and to read messages, called "tweets". Tweets can be up to 140 characters long.*

YouTube	*2005*	*World's most popular online video community,*	*YouTube provides a forum for people to connect, inform, and inspire others across the globe and acts as a major distribution platform for original content creators and advertisers, large and small*
Snapchat	*2011*	*Multimedia messaging app*	*Pictures and messages are usually only available for a short time before they become inaccessible to their recipients.*
Pinterest	*2010*	*Social media web and mobile application*	*catalogue of ideas" that inspires users to "go out and do that thing", rather than as an image-based social network*
Tumblr	*2007*	*Microblogging and social networking website*	*The service allows users to post multimedia and other content to a short-form blog*

Table 1: Most popular social networks now (Wikipedia)

In relation to AR, this new technology is still developing so its use is not so frequent, however it is having a huge impact on social media since it can be a method of entertainment, teaching, helping, or acting as a source of information or knowledge (Yuen, Yaoyuneyong & Johnson, 2011).

One of the most popular application of AR to social media are facial filters. Facial filters consist of, through a mobile device, superimposing virtual objects over the face of the person. The first social network that introduced this innovation was Snapchat, a social network for smartphones where users send images and videos that last only for few seconds. The application allows users to add texts, drawings or AR filters to the images and videos and send them to their contacts. This social network gained a lot of fame because of the originality of its AR facial filters. The functioning is very easy: With the

internal camera of the phone, the virtual elements superpose in the face that appears on the screen (Fig. 17).

Figure 17: AR on Snapchat filters

After the success of Snapchat with facial filters, other social media platforms like Instagram or Facebook started developing AR technologies on their applications. We can see the same functions as on Snapchat of AR filters (Fig. 18).

Figure 18: AR on Facebook and Instagram

More recently, AR has been taken to the place of creating social media apps based specifically on AR. For example Catxy[13], is a social network based on geolocated AR where people post pictures in places and when another person stops there, she can see the photos taken by other people exactly in that place through the AR application. In addition, Facebook has introduced a specific tool for developing its own interactive Facebook camera experiences, called Facebook AR Studio.

Considering how much AR is a part of social media today, in the future, it is predicted that AR will continue being a successful part of it. Apart from these, social networks are encouraging people to not only use their AR features as much as possible, but also to create their own AR experiences by giving the tools they need to build AR camera lenses and effects (Bullock, 2018).

Marketers are starting to embrace this technology more and more and will keep developing new ways to promote their brands through AR. However, this technology is not very accessible yet, so the biggest changes will likely come when the technology becomes more accessible and more consumers will be able to try it (Bullock, 2018).

3. METHODOLOGY

Once we have explained Augmented Reality as a concept, its evolution and applications in different fields, the next section explains an empirical study based on a specific example of AR: facial filters in Social Media. Facial filters consist of, through a mobile device, superimposing virtual objects over the face of the person. These facial filters are currently very common in Social Media as Snapchat or Instagram; here consumers can enjoy the different filters offered by the platform. With the increasing popularity of facial filters, these platforms have developed a wide variety of them, to the point that brands have also used the creation of these filters as a marketing tool.

Through an online survey, we can obtain information about the sociodemographic profile that use this kind of technology the most and the least, as well as users' perceptions and behavioral intentions towards it. With these goals in mind, we have carried out a questionnaire to a sample of people in order to collect information about consumer

[13] https://www.youtube.com/watch?v=F6bJq-W6HbE

behavior in Social Media in relation with facial filters. The data analysis will allow help us to understand the way of functioning of this specific technology in social networks.

3.1. Population under study and sampling plan

The questionnaire was aimed at people who had already had some experience with facial filters in Social Media, independently of having or not a profile in them.

As previously mentioned, an online questionnaire was carried out, and the it was mainly based on closed-ended questions, where the respondents are given a list of predetermined responses from which to choose their answer. This kind of surveys give us some advantages because cost are reduced, the participation is easy and it is quickly to use; but, also, there are some disadvantages as the low deep of questionnaires, and that maybe not everyone wants to participate.

We used a non-probabilistic sampling procedure, consisting of convenience and snowballing sampling (Jiménez, Orús and Pina, 2017). We send the questionnaire to a reduce group of people via online (principally WhatsApp) and that group sends it to more people and these people to other. Thus, the questionnaire was distributed mainly through WhatsApp application, due to the fact that is a free cross-platform messaging service that allows the sending of text messages as well as sharing documents available on mobile devices, that facilitates the participation. It is also useful in terms of reaching more participants, because we asked them to share it with other relatives or friends in order to obtain a large sample. This technique is known as snowball sampling and was carried out in an exponential manner since individuals were able to share the questionnaire with whomever they wanted.

3.2. Type of study

The questionnaire was created with Google Forms and it consisted of three parts: general questions, second one of more specific questions, and a last part of control and classification questions. Regarding the structure of the questions, there was a mix between Likert scale questions (from 1 = totally disagree, to 7 = totally agree) and single-choice nominal questions. As previously mentioned, the first question asked participants if they had had any experience with facial filters on social media. If the answer was yes, they filled out the entire questionnaire. If the answer was no, they were filtered to the last block of classification questions.

In the first block, general questions were asked in order to obtain information about which are the most Social Media used and the use of facial filters in them. This allows us to know the most popular social networks and the use per week by consumers. Moreover, we can observe and analyze if there is a relationship between the use of facial filters and the most popular social networks or, by contrast, users use more filters in social networks less known.

In the second block of questions, we asked specific questions about some characteristics of the filters: perceived originality, ease of use, aesthetic, satisfaction, etc.; apart from other questions related with the user's intentions of continuing using filters or the intention of recommending the filters to others. These variables were measured with 7-point Likert scales. The answers will allow us to analyze consumers' perceptions and which characteristics of filters should be improved to attract more the consumer and so reach a higher number of users. In addition, it is useful to analyze the future predictions with the intentions of the user or the possibility of expansion being recommended. Among all the variables that were measured in the questionnaire, we are going to focus on some of them.

First, originality can be defined as the level of newness of the product or service to the consumer or to the firm (Gatignon and Xuereb, 1997), or as the degree of newness and differentiation that some individuals achieve by performing certain actions (Casaló, Flavián & Ibáñez-Sánchez, 2018). Original products are generally perceived by users or consumers as unusual, innovative, sophisticated, interesting and surprising (Derbaix & Vanhamme, 2003).

It has been also demonstrated that the originality in a product increases the amount of word of mouth (WOM) generated (Moldovan, Goldenberg, & Chattopadhyay, 2011), which can be defined as the passing of information from person to person by oral communication, but it can lead to a positive or negative balance. Original products are more likely to cause opinions and feelings in people than less original ones, and those opinions and comments will lead to generate word of mouth (negative or positive) (Rimé, Philippot, Boca & Mesquita, 1992).

Therefore, in relation with facial filters, new, innovative, surprising and interesting content will be more original due to its novelty, and so, it will cause a greater WOM

effect, which leads to more and more people knowing about it, willing to use them or recommend them.

Second, the ease of use is a measurement of how easy the finished product is to use by its intended users (Venkatesh & Davis, 2000). In product design, there is often a battle between delivering functionality and delivering ease of use. When products are equal in terms of functionality, users will always choose the easier to use (Venkatesh & Davis, 2000). With this being said, we can establish that ease of use is a positive characteristic that will affect the users´ decisions. In the specific case of facial filters, we expect that the easier the use of the technology, the faster the understanding of the functioning of filters and so the more people using it and in a more regular basis.

Third, satisfaction can be defined as "the degree to which one believes that an experience evokes positive feelings, a critical measure of information system success and effectiveness" (Chen & Chen, 2010; p.30). In the consumption context, it can be defined as "the summary psychological state resulting when the emotion surrounding disconfirmed expectations is coupled with the consumers' prior feelings about the consumption experience" (Oliver, 1981; p. 29).

Satisfaction is directly related with expectations and performance. An expectation is a strong belief that something will happen or be the case, while a performance is the action or process of performing a task or function[14]. Lower expectation and/or higher performance lead to positively influence customer satisfaction and continuance intention, while higher expectation and/or lower performance will lead to a negative influence customer satisfaction and no continuance intention (Bhattacherjee, 2001).

Regarding the case of facial filters, a high satisfaction will be a positive effect that will probably make the consumers have a second experience with the filters and that action, to recommend them to friends and other future consumers.

As it has been said, consumers' intention to repurchase a product or continue service use is determined primarily by their satisfaction with prior use of that product or service (Anderson and Sullivan 1993; Oliver 1980, 1993). Once a consumer has tried the product

[14] https://static1.squarespace.com/static/53d15002e4b0a866cf0e0466/t/59b96d20e3df28b377743488/1505324320072/Cara+Croft+Facing+Expectations+Seminar.pdf

and has obtained a great satisfaction, the possibility of continuing using it increases. The continuance intention means that users will repurchase the product or service and it is the key to building and retaining a loyal base of long-term consumers (Anderson and Sullivan, 1993). In the case of facial filters, once a user has obtained a high satisfaction during his experience he is likely to use the filter in a future occasion, which will make him a loyal consumer.

Finally, classification questions were asked in order to determine the profile of the sample. We asked about gender, range of age, education level and questions about their personality. These answers help the analysis to define the characteristics of consumers and differentiate between them. In this way, we can establish a relationship between specific profiles of users and specific ways of using filters and social networks, and see how these characteristics affect the way of using it.

4. ANALYSIS

4.1. Sample characteristics

First of all, analyzing the data extracted from the survey, we can see that, from the total sample of 401 individuals, 72% have had an experience with facial filters on social media (n = 289), while 28% have not (n = 112). This demonstrates that the majority of the group has used facial filters on social media.

Next, we are going to analyze the sample's characteristics. As we can observe in Table 2, the number of women is higher than the number of men. More than half of the sample is between 25 and 32 years old, followed by people older than 32 and with a minority of people under 18 years old. Finally, more than one third of the sample have higher education studies, while only 25.2% had secondary education (Table 2). Regarding the daily use of consumers of Social Media, we can see that almost one-half of the sample consume Social Media for 3-4 hours in a day. 1/3 spend 1-2 hours of the day using Social Media, and the rest 1 hour.

	Total Sample (n = 401)	*Users of facial filters (n = 289)*	*Non-users of facial filters (n = 112)*
Sex			
% female	*67.3%*	*53.6 %*	*13.7 %*
% male	*32,7 %*	*18.5 %*	*14.2 %*
Age			
Under 18	*1.,0%*	*13.5 %*	*2.5 %*
19-32	*57.8%*	*51.1 %*	*6.7 %*
Older than 32	*26.2%*	*7.5 %*	*18.7 %*
Education level			
Secondary	*25.2%*	*18 %*	*7.2 %*
Undergraduate	*36.4%*	*32.4 %*	*4 %*
Graduated	*38,4%*	*21.7 %*	*16.7 %*
Daily use of S.M.			
< 1 hour	*22.2%*	*8.2 %*	*14 %*
1-2 hours	*36.9%*	*26.4 %*	*10.5 %*
> 3 hours	*40.9%*	*37.4 %*	*3.5 %*

Table 2: Sociodemographic characteristics of the sample

Apart from the data of the total sample, Table 2 shows the differences between users and non-users of facial filters, with the goal of exploring differences in sociodemographic characteristics between these two groups of respondents. In this way, we can appreciate that there are many more women who use of facial filters (53.6%) than women that have not used facial filters (13.7%); while males are almost equal (18.5% and 14.2%, respectively). To determine whether there is a significant difference between the expected frequencies and the observed frequencies in one or more categories, we carried out a chi-square test. The test was significant ($\chi^2(1) = 23.466$, $p < 0.05$), revealing association between participants' gender and use of facial filters. Therefore, although there are more females in the sample, they are more users of facial filters than males.

Regarding the respondents' age, we observe that great majority of people under 18 and between 19-32 are users of facial filters (13.5% and 51% respectively; see Table 2); yet, among people older than 32, there are more non users (18.7%) than users (7.5%). The chi-square test was again significant ($\chi^2(1) = 134.105$, $p < 0.05$), revealing association between participants' age and use of facial filters. The conclusion we obtain from this is that young people use facial filters more than old people.

We analyzed differences in the education level according to three levels: secondary, undergraduate and graduate. In this way, the highest difference between users and non-

users is in the undergraduate level (32.4% out of 36.4%). As with gender and age, the chi-square test was significant ($\chi^2(1) = 39.483$, $p < 0.05$), revealing association between participants' education level and use of facial filters. With this, we can say that undergraduates are the main users of facial filters in social media.

Regarding the daily use of social media, we can observe that among people that use them less than 1 hour there is a higher proportion of non-users (14% versus 8.2%). The situation is more balanced among people that uses social media 1-2 hours, where there are more users (26.4%) than non-users (10.5%). Finally, among people that use social media more than three hours there are much more users (37.4%) than non–users (3.5%). As in the other cases, the chi-square test was significant ($\chi^2(1) = 84.793$, $p < 0.05$), revealing association between participants' social media frequency of use and use of facial filters. From this information, we can obtain that the percentage of use of facial filters increases with the percentage of time spent on social media.

Once we have analyzed the sociodemographic characteristics of the sample, we are going to analyze the frequency of use of the most popular social media that have the option of use of facial filters (Table 3). We only analyzed those respondents who reported some experience with facial filters in social media. To this end, we differentiate between three groups: heavy users (they use social media every day or every 2-3 days), medium users (they use social media every 4-7 days), and light users (they use social media less than once a week). In this way, heavy users prefer Facebook (29.8%) and YouTube (28.7%), while the less used by these users are Tik Tok. This analysis can be attributed to the fact that Facebook and YouTube are the most known social networks, and Tik Tok the least known.

Second, for medium users (every 4-7 days), the most used social network is YouTube and Instagram (only for every 6-7 days users), and again Tik Tok the less used.

Finally, social networks that are less used or people does not have a profile on them would be Tik Tok and Snapchat.

	Facebook	*Twitter*	*Instagram*	*Snapchat*	*TikTok*	*YouTube*
Heavy users	*29.8*	*16.6*	*7.3*	*17.0*	*2.4*	*28.7*
Medium users	*31.5*	*26.6*	*85.1*	*11.1*	*1.0*	*59.6*
Light users	*38.8*	*56.7*	*7.6*	*72.0*	*96.6*	*11.7*
Total	*100*	*100*	*100*	*100*	*100*	*100*

Table 3: Frequency of use by social network

After analyzing the use of each social network, we are going to observe the use of facial filters in each social network (Table 4). Twitter and YouTube are not in the list because they do not offer this option. The most facial filters used by consumers are placed on Instagram (86.2%), followed by Snapchat (63%); while Facebook and TikTok have the least used filters.

The conclusion we obtain is that there is a positive relation between the use of Instagram as a social network and the use of facial filters, because it has a high percentage in both. It happens the same with Tik Tok: it has a low percentage of use as a social network and with the AR facial filters functionality. However, there is a negative relation between the use of Facebook or Snapchat and the use of facial filters: On Facebook, while it has a very high percentage of use as a social network, it has a low percentage of its facial filters use; the oppsite effect occurs with Snapchat, that is one of the less used networks but one of the most facial filters used.

	Instagram	***Facebook***	***Snapchat***	***Tik Tok***
NO	*13.8*	*94.1*	*36.7*	*97.9*
YES	*86.2*	*5.9*	*63.3*	*2.1*
Total	*100*	*100*	*100*	*100*

Table 4: Use of facial filter per social network

4.2 Perceptions about the use of facial filters, satisfaction and behavioral intentions

In order to determine if the means of the data are significantly positive or negative, we are going to use one sample T tests (Table 5). Taking into account that the scale was from 1 (totally disagree) to 7 (totally agree), we can say that the indifference of the user will be placed at 4. Thus, the results of one sample T tests, comparing the average values with the middle point of the scale (4) were significant for ease of use and satisfaction, but not significant for originality and intentions (see Table 5).

In that way, and analyzing only the variables that were significant in the test, we can say that users have a positive perception of the ease of use (6.05 > 4), and satisfaction (4.2 > 4). The rest of the variables are not significant, that will mean they have average levels, which is also positive because there are not low or negative values.

We can conclude thatusers have positive perceptions of facial filters due to the fact that satisfaction was positive and above the average value. In addition, the rest of the value are around the average, with the absence of low values.

	Average	***Standard deviation***	***t***	***gl***	***Sig.***
Originality	*3.98*	*1.48*	*-.26*	*288*	*.80*
Ease of use	*6.06*	*1.37*	*25.52*	*288*	*.00*
Satisfaction	*4.29*	*1.56*	*3.22*	*288*	*.00*
Intention to use of filters	*4.11*	*1.83*	*1.04*	*288*	*.29*
Intention to recommend filters	*4.04*	*1.85*	*.41*	*288*	*.68*
Intention to use social media	*3.99*	*1.85*	*-.01*	*288*	*.99*

Table 5: One sample T – Test regarding the perceptions of facial filters.

Finally, we are going to analyze the correlations between the variables out of interest. Before that, we have to make it clear that there is a difference between the variables: while the intention of use (filters and social media) and the intention of recommendation are related to future behavioral intentions, the variables of originality and ease of use are perceptions. In addition, satisfaction is considered as an affective evaluation. These differences are important because a future intention in relation with a product is determined by the perceptions and evaluations of it.

The Pearson correlations between all variables were positive and significant (Table 6). However, we can observe that the level of correlation varies depending the pair of variables under consideration; some variables are more likely to affect or be affected by others.

First, we can appreciate that the correlation between the perceptions of originality and ease of use is situated in a medium-low level. This can be attributed to the fact that the originality of a product does not imply the facility of use of it and vice versa.

	1	*2*	*3*	*4*	*5*	*6*
1. ***Originality***	*1*					
2. ***Ease of use***	*.387**	*1*				
3. ***Satisfaction***	*.588**	*.330**	*1*			
4. ***Intention to use of facial filters***	*.468**	*.317**	*.688**	*1*		
5. ***Intention to recommend facial filters***	*.482**	*.256**	*.726**	*.765**	*1*	
6. ***Intention to use social media***	*.459**	*.212**	*.699**	*.765**	*.834**	*1*

Table 6: Pearson Correlation between variable

Linking these two variables (originality and ease of use) with satisfaction, we can observe that the correlation between originality and satisfaction is medium, because originality will be a determinant aspect for the satisfaction of the user; but the correlation between the ease of use and satisfaction is low, because maybe the fact that a product is very easy to use does not imply the satisfaction of the user.

The situation is the same with the correlation between perceptions (originality an ease of use) and the intentions: The correlation between the originality and the intentions is medium and the correlation between the ease of use and the intentions is low. These similarities can be explained with the high correlation between satisfaction and the intentions. This is because satisfaction is the most required sensation to recommend a product or service.

Finally, the highest correlation is between the three intentions (intention of using social media, intention of recommend facial filters, intention of using facial filters). These three variables show the highest correlation because they mean an intention in a future that in some cases implies the other ones.

As a conclusion, we can say that originality and then ease of use (in this order) will determine the satisfaction with the product, and that satisfaction will lead to a future intention (use or recommend).

5. CONCLUSIONS

The goal of the undergraduate dissertation has been to identify the way that AR facial filters in affect the perceptions, evaluations and behaviors of social media users. We have focused on the concept of AR. AR technology can be defined as the creation of an experience by adding virtual elements as digital images, sensations or graphics, to the real world. Since the birth of the concept of AR until the most innovative developments of the latest years, we can find different inventions as the Sensorama simulator created by Morton Heilig, the Ultimate Display by Ivan Sutherland or the GoogleGlass that have been developing this technology with the years. After explaining this concept, differentiating from other years, and overviewing its evolution in the past 40 years we have indentified three types of AR, and they are differenced in the way that the content is integrated in the experience. Each one of them has its particularities that makes them more or less appropriate for each situation. AR with markers, printed symbols in paper or images over which there are virtual elements that appear when the associated application of AR recognizes the marker and enables the experience; marker-less AR, where applications are based on tangible objects, without the use of any marker, and by geolocation, where the device combines the information given by the GPS and information downloaded from the Internet.

Up to date, AR has been introduced in several industries such as the entertainment, engineering, robotics and military industries; however, as a new tendency of the most recent years, AR plays a vigorous role in contemporary marketing. AR is relatively new to the industry, and it allows clients to see a product before buying it and use it as if it was real. The most important issue is that users can know the values, characteristics and benefits of the products in places where it would be physically impossible.

AR is also having a huge impact on social media since it can be a method of entertainment, teaching, helping, or acting as a source of information or knowledge. The most popular application of AR on social media are facial filter, of which we have analyzed its impact on social media users.

Through an online survey, we obtained information about the sociodemographic profile that use this kind of technology: From the total sample of 401 individuals, 72% have had an experience with facial filters on social media, while 28% have not. This demonstrates that the majority of the group has used facial filters on social media. Moreover, analyzing the results of the survey, we obtained that, although there are more females in the sample, they are more users of facial filters than males, that younger people are more users of social filter than older people, that people that is currently coursing a grade is more user of facial filters than secondary students and graduated people and that the percentage of use of facial filters increases with the percentage of time spent on social media: People that spend more hours on social media uses more facial filters than the ones that spend 1 hour.

According to the frequency of use of each social media, we can state that heavy users have preference for Facebook (29.8%) and YouTube (28.7%), while the less used by these users are Tik Tok; for medium users (every 4-7 days), the most used social network is YouTube and Instagram (only for every 6-7 days users); and again Tik Tok the social networks that are less used or people does not have a profile on them would be Tik Tok and Snapchat. Analyzing each social network we found out that there is a positive relation between the use of Instagram as a social network and the use of its facial filters and it happens the same with Tik Tok: it has a low percentage of use as a social network and as its facial filter. However, there is a negative relation between the use of Facebook or Snapchat and the use of its facial filters.

The results of the survey have also revealed that users have positive perceptions of facial filters due to the fact that satisfaction and ease of use has a positive and over the average value. In addition, the rest of the value are around the average, with the absence of low values. Finally, analyzing the correlation between those variables, we can state that that originality and then ease of use (in this order) will determine the satisfaction with the product, and that satisfaction will lead to a future intention (use or recommend).

According to this, we can state that, even the percentage of use of facial filters over the sample is very high; it is mainly focused on young people. In order to change this, marketers and facial filters developers or community managers could try to extend its target by introducing different themes in facial filters or developing new strategies to attract a different public. In addition, we can appreciate the huge difference of use of facial filters depending on the social network. As a recommendation to filter developers we could propose to increase the originality of filters on those social networks with low percentage of use of these filters (Facebook and Tik Tok) in order to make a difference from the leaders on facial filters social networks (Instagram and Snapchat). However, originality and ease of use are very well perceived by users creating great levels of satisfaction and the only recommendation we can made is to keep increasing this variables in order to maintain and increase these satisfaction levels.

To conclude, the main limitation found while doing the study was the difficulty to spread the questionnaire to a significant number of people. It was necessary to achieve a great sample in order to obtain proper information of the survey. However, the needed number of responses was achieved and the questionnaires gave us enough information in order to make the analysis.

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7. ANEX

This questionnaire about facial filters on social media was made to 401 people.

1.- ¿Has tenido alguna experiencia con los filtros faciales en redes sociales?

☐ *Sí, y he usado filtros faciales patrocinados por marcas.*

☐ *Sí, pero no he usado filtros faciales patrocinados por marcas.*

☐ *No he usado nunca filtros faciales.*

2.- En primer lugar, indica el uso que haces de las siguientes redes sociales en una semana normal:

	Nunca	1 día	2-3 días	4-5 días	6-7 días	No tengo perfil
Facebook	○	○	○	○	○	○
Twitter	○	○	○	○	○	○
Instagram	○	○	○	○	○	○
Snapchat	○	○	○	○	○	○
TikTok	○	○	○	○	○	○
Youtube	○	○	○	○	○	○

3.- ¿En qué red o redes sociales has usado filtros faciales?

☐ *Facebook*

☐ *Instagram*

☐ *Snapchat*

☐ *TikTok*

☐ *Other:*

4.- En general, ¿con qué frecuencia utilizas estos filtros faciales?

☐ *Todos o casi todos los días*

☐ *Al menos una vez a la semana*

☐ *Al menos una vez al mes*

☐ *Con menor frecuencia*

5.- Originalidad: En general, mis experiencias con los filtros faciales han sido…

	1	2	3	4	5	6	7
originales	○	○	○	○	○	○	○
novedosas	○	○	○	○	○	○	○
diferentes	○	○	○	○	○	○	○
únicas	○	○	○	○	○	○	○
creativas	○	○	○	○	○	○	○
sofisticadas	○	○	○	○	○	○	○

6.- Estética: En general, mis experiencias con los filtros faciales…

	1	2	3	4	5	6	7
han sido estéticamente agradables.	○	○	○	○	○	○	○
han mostrado diseños visualmente placenteros.	○	○	○	○	○	○	○
han sido visualmente llamativas.	○	○	○	○	○	○	○
me han parecido atractivas.	○	○	○	○	○	○	○

7.- Facilidad de uso: En general, usar los filtros faciales…

	1	2	3	4	5	6	7
es claro y fácil de entender.	○	○	○	○	○	○	○
no requeriere un gran esfuerzo mental.	○	○	○	○	○	○	○
es intuitivo.	○	○	○	○	○	○	○
es fácil.	○	○	○	○	○	○	○

8.- Utilidad percibida: En general, usar los filtros faciales me permite generar contenido para…

	1	2	3	4	5	6	7
compartir información.	○	○	○	○	○	○	○
mantenerme en contacto con los demás.	○	○	○	○	○	○	○
comunicarme con los demás.	○	○	○	○	○	○	○
interactuar con otros usuarios.	○	○	○	○	○	○	○
estar al día (actualizada/o)	○	○	○	○	○	○	○

9.- Interactividad: En general, usar los filtros faciales me permite…

	1	2	3	4	5	6	7
modificar el contenido que existe a mi alrededor.	○	○	○	○	○	○	○
manipular varios aspectos de mi entorno.	○	○	○	○	○	○	○
hacer grandes cambios en mi entorno.	○	○	○	○	○	○	○
cambiar o influir en la forma en la que se ve mi entorno.	○	○	○	○	○	○	○

10.- Satisfacción

	1	2	3	4	5	6	7
Estoy satisfecho con mis experiencias con filtros faciales.	○	○	○	○	○	○	○
Estoy encantado con mis experiencias con filtros faciales.	○	○	○	○	○	○	○
Mis experiencias con filtros faciales han superado mis expectativas.	○	○	○	○	○	○	○
En general, estoy satisfecho con mis experiencias con filtros faciales.	○	○	○	○	○	○	○

Cuando he usado los filtros faciales, me he sentido totalmente abstraído en la experiencia.	○	○	○	○	○	○	○
Cuando he usado los filtros faciales, el tiempo ha pasado volando.	○	○	○	○	○	○	○
Cuando he usado los filtros faciales, he olvidado todas mis preocupaciones.	○	○	○	○	○	○	○
Utilizar los filtros faciales me hace olvidar a menudo dónde estoy.	○	○	○	○	○	○	○

11.- Intención seguir usando filtros faciales

	1	2	3	4	5	6	7
Trataré de seguir usando los filtros faciales.	○	○	○	○	○	○	○
Mi intención es seguir utilizando los filtros faciales	○	○	○	○	○	○	○
Me gustaría seguir usando los filtros faciales.	○	○	○	○	○	○	○

12.-Intención recomendar filtros faciales

	1	2	3	4	5	6	7
Probablemente recomendaría los filtros faciales a amigos y familiares interesados.	○	○	○	○	○	○	○
No perdería la oportunidad de contarles a otros interesados sobre los filtros faciales.	○	○	○	○	○	○	○
Probablemente diría cosas positivas sobre los filtros faciales.	○	○	○	○	○	○	○

12.- Intención uso redes sociales con filtros faciales: Si una red social incluyera filtros faciales entre sus funcionalidades...

	1	2	3	4	5	6	7
Trataría de utilizarla en el futuro.	○	○	○	○	○	○	○
Tendría la intención la utilizaría en el futuro.	○	○	○	○	○	○	○
Me gustaría utilizarla en el futuro	○	○	○	○	○	○	○

Sexo

☐ *Hombre*

☐ *Mujer*

Edad

☐ *Menos de 18 años*

☐ *Entre 19 y 25 años*

☐ *Entre 26 y 32 años*

☐ *Entre 33 y 39 años*

☐ *Entre 40 y 46 años*

☐ *Entre 47 y 55 años*

☐ *Mayor de 55 años*

Nivel de estudios

☐ *Sin estudios*

☐ *ESO / Graduado escolar*

☐ *Bachillerato / FP*

☐ *Universitarios (cursando)*

☐ *Universitarios (finalizados)*

☐ *Postgrado / doctorado*

Experiencia en el uso diario de redes sociales en global

☐ *Menos de 1 hora*

☐ *1-2 horas*

☐ *3-4 horas*

☐ *Más de 5 horas*